

SOME ASPECTS OF THE LIFE HISTORY OF BLACKBUCK IN NEPAL¹

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Blackbuck antelope (*Antelope cervicapra* L.) were considered extinct in Nepal until 1975 when 2 small remnant populations were found in the Banke and Bardia districts of the western Terai. Observations of these blackbuck were made from 1 October 1976 to 27 January 1977 to determine population status, behavior patterns, habitat use, and preservation options. This report describes population numbers, daily activity patterns, breeding seasons, territoriality, and food habits.

INTRODUCTION

In Nepal, the blackbuck was commonly found in the eastern and western Terai, an extension of the Gangetic Plain lying along the base of the Himalayan foothills. Until recently, blackbuck were considered extinct in both areas. Reports by Dinerstein (1975) and Wegge and Wilson (1976) revealed the existence of two small remnant populations in the Bardia and Banke districts, respectively, of the western Terai. This report describes aspects of the life history of blackbuck in the 2 remnant populations, obtained from a larger study to determine the status of blackbuck in Nepal and the means for their preservation as part of Nepal's unique fauna.

METHODS

The Bardia population was observed from 18 to 30 October 1976 and from 22 to 27 January 1977. The Banke population was studied from 3 to 10 November 1976 and from 7 to 13 January 1977.

Observations were made on foot, except in

Bardia, where an observation platform was built in a tree that was centrally located in the dominant male's territory. Population estimates were made from simultaneous sightings, individual recognition, and by drives where appropriate. Binoculars of 7×35 power and a 20× telescope were essential for observing the animals.

Study Area

Bardia: The Bardia area, about 2.6 km², is situated approximately 4 km north of the town of Gularia, in a bend of the old Babai River bed, near the village of Kaidi. A blackbuck protection guard post, operated by the Forest Department, is situated there.

Standing water is found in the old River bed during most of the year, but dry areas appear in many places during the hot season of March to June. The area is mostly marginal agricultural land and grazing land bordered on three sides by the old river bed and on the other side by scrub jungle.

The agricultural land consists of a patchwork of fallow and cultivated fields, the major crops being corn (*Zea mays*), wheat (*Triticum aestivum*), rahar dal, mas dal (*Lens esculenta*), musoori dal (*Phaseolus mungo*), mustard (*Brassica campestris* or *B. juncea*), and peanuts (*Arachis hypogaea*). Rice (*Oryza*

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sativa) is not a major crop as the soil is sandy and porous. Rahar dal is the major and most conspicuous crop because of its height (up to 2 m), dense growth, and persistence throughout the year.

Vegetation on fallow fields varies with the intensity of the livestock grazing regime, which is determined by the size of the area and the nearness of standing crops that may be damaged by livestock. Short-cropped dub grass (*Cynodon dactylon*), and the forbs chamcham (*Cassia tora*) and ganja (*Cannabis sativa*) form an herbaceous layer in large (greater than 1 ha), agriculturally unproductive, heavily grazed fields. Ber (*Zizyphus mauritiana*), a thorny shrub, is dense in heavily grazed areas with relatively little past cultivation.

The small (less than 1 ha) fallow fields are generally more productive and less heavily grazed than the larger fields, and are interspersed in a patchwork fashion with standing crops. The following short graminoids dominate: *Eragrostis coarctata*; *Panicum* spp. (2); *Paspalum distichum*; *Eleusine indica*; *Setaria glauca*; *Thylactodenia aegyptium*; *Fimbristylis* sp.; *Cyperus* sp.; *Chrysopogon asciculatus*; *Saccharum munja*; and *Sporobolus diander* (Dinerstein 1975). These graminoids, spared from grazing, form a thick mat under the rahar dal plants.

In the jungle to the northeast, simal (*Bombax malabaricum*) dominates, but khair (*Acacia catechu*) and sissoo (*Dalbergia sissoo*) are also found. The understorey is dominated by dense clumps of ber with an herbaceous layer of chamcham and heavily grazed grasses. The canopy cover is rather open, but visibility is restricted in the understorey by ber.

Banke: The Banke area is situated about 37 km southeast of Nepalganj, between the Rapti River and the Dudwa Range, near the

villages of Jamuni and Bhaghawanpur. It is mostly open, cultivated land with a few scattered clumps of mango trees covering roughly 8 km². The Rapti River makes a wide annual floodplain of sandy flats vegetated mainly by *Tamarix indica* and short annual graminoids. Floodplain areas subject to periodic flooding are partly covered with a tall grass, *Vetiveria zizyanoides*. Order parts of the area are used as transient grazing and crop lands.

Rice is practically the sole crop, with mustard, wheat, and various types of dal of limited importance. During the hot season, the fields are not cultivated, but cattle graze on what little vegetation remains.

The jungle along the base of the Dudwa Range has been heavily affected by grazing and woodcutting. The dense growth of thorny and unpalatable shrubs, that dominates the first few hundred metres from the edge of the croplands, is the result of this disturbance. Beyond the first few hundred metres, the understorey opens into small glades of 0.04-0.2 ha. These "dhoenias" are characterized by large dhoe trees (*Lagerstroemia parviflora*) with large clumps of ber, short grasses, and chamcham below. Dhoenias are distributed patchily throughout the jungle up to the base of the hills.

RESULTS AND DISCUSSION

Population Estimates

Bardia: In the Bardia area, 11 blackbuck were sighted by myself or forest guards (3 adult males, 1 two-year-old male, 1 yearling male, 3 adult females, 1 yearling female, and 2 fawns).

Banke: Estimating the number of blackbuck in the Banke area was difficult because of unharvested rice in the agricultural areas

during 1976. In addition, the nocturnal behavior of the animals hindered observations in 1977. Simultaneous sightings of 5 females (3 adults and 2 yearlings), and 1 adult male were made by myself and villagers during 1977. Other villagers reported seeing, at different times, 2 groups of 6-7 blackbuck, with 1-2 adult males in each group. Whether these groups represent different animals is difficult to say; I observed females ranging widely throughout the area.

From the above information, a minimum of 7 blackbuck used the Banke area. Wegge and Wilson (1976) only saw 2 blackbuck, but they concluded from local interviews that 15-20 blackbuck used the area during 1976. Villagers confirmed this estimate, but said that blackbuck were extremely scarce in 1977, and they could not give an estimate of blackbuck numbers. Some villagers speculated that the 1976 monsoon flooding of the Rapti River had driven the animals to India, 1.5 km to the south.

Daily Activities

Bardia: The blackbuck in Bardia, being less disturbed than those in Banke, were more easily observed. The 4 bachelor males were usually seen feeding and interacting in open pastures and fields outside the dominant male's territory, during evenings and early mornings. Toward midmorning, when farmers and cattle became active, the bachelor males moved to cultivated areas where cover, in the form of rahar dal and corn, was better.

Similarly, the main group (the dominant male, 2 adult females and their fawns, and the yearling female) was seen feeding in large fields (greater than 1 ha) during the evenings and early mornings, when human disturbance was least. During the day, the group stayed

in an open, about 0.5 ha, fallow field feeding, interacting, and resting. Upon being disturbed, they would escape to the dense rahar fields that surrounded the open field on 3 sides; 15-30 minutes after the disturbance ended, the group would come into the open, usually the dominant male first, and remain until disturbed again.

Banke: Because of the limited number of observations on Banke blackbuck, little is known about their daily habits. The 4 females were observed 4 times in the fallow fields near the forest edge before sunrise. Twice they were seen travelling across the open fields from the direction of the Rapti floodplain, some 2 km distant. Immediately after sunrise, the females moved into the scrub jungle, where they presumably stayed all day to avoid contact with farmers, hunters, and cattle. Apparently, after nightfall they returned to the fields to feed.

Breeding Season

Bardia: On 20 October, in Bardia, 1 of 2 adult females appeared to be pregnant. On 23 October, a new fawn was seen with the group, probably having been born to this female a day or 2 before. On 26 October, a second 1-2 day old fawn was seen with the group.

Three instances of rutting behavior, such as nose-up display (nose up and horns parallel with the back), chasing, and attempted mounting were observed in October. The 2 females that were courted had just given birth and were not receptive to the male's approaches. Copulation was not observed.

Banke: Villagers in Banke said that fawns were born in February and March. A villager raised a male blackbuck that was found as a newborn in February.

Although males are sexually active at all

times of the year (Schaller 1967), rutting peaks are caused by the availability of estrous females, which is influenced by fawning peaks; these peaks, in turn, are influenced by seasonal changes in environmental conditions that influence fawn mortality (Mungall 1978). Mungall stated that females are polyestrous throughout the year until bred; thus, in the absence of environmental extremes, fawning, and therefore breeding, occurs throughout the year.

Records of 125 blackbuck born in the London zoo (Jarvis and Morris 1962, cited in Schaller 1967) indicate no birth peaks. Schaller (1967), working with wild Indian blackbuck in Kanha Park, reported that 1 fawn was born during September, and 12 were born between February and April. Conversely, at Sikandra, near Agra, he noted that 16 fawns were born between August and September, and only 3 were born in February. Some births were noted at all times of the year.

With a 5-6 month gestation period (Brown 1936, Asdell 1946, and Mungall 1978), the fawns in Bardia were conceived during late April. This agrees with Schaller's (1967) data for Sikandra; but, for Kanha, he reported a minor peak in April, and a more intense peak from August to October. Lydekker (1924), Asdell (1946), and Prater (1948) reported the main rutting season as February and March.

By looking at seasonal environmental changes occurring in Nepal and northern India, one can discern some advantages of the February to April rutting peak observed in this study, and predominantly reported in the literature. A female is bred in March, and early gestation, the least energy demanding period of gestation (Moen 1973), proceeds during the hot dry season when forage quality is low and heat stress is high. Precipitation increases

with the approach of the monsoon rains in June, causing a flush of new vegetation at the same time as energy demands of gestation become greatest. Good conditions prevail throughout the monsoon, which ends by the end of September. Fawns are born in October and mature during the mild winter season when abundant, nutritious forage is available to the lactating mother.

Breeding and fawning during other times of the year would appear disadvantageous, with respect to availability of nutritious forage and favourable climatic conditions, for late gestation, lactation, and post-lactation fawn survival. Nevertheless, Schaller (1967), for Kanha Park, reported a higher fawning peak from February to March, than for August to October, while some births occurred throughout the year.

Seasonal changes apparently do not strongly limit the breeding cycle of blackbuck, as they do with ungulates in more extreme north temperate climates. Indeed, Schaller proposed the same hypothesis, and noted that sexual cycles of other Indian ungulates, such as chital (*Axis axis*) and barasingha (*Cervus duvauceli*), varied from area to area, seemingly in response to local environmental conditions.

Territoriality

Bardia: Of the 3 adult males, only 1 had established a territory. Another adult male, a 2-year-old, and a yearling formed a bachelor herd that roamed the area along the periphery of the territory. Forest Department guards said that the third adult male ranged widely throughout the area with an adult female. The other 3 females and the 2 fawns were not observed outside the territory of the dominant male.

Mungall (1978) reported that females, in

Texas, travel a daily circuit, with a male attending them as they pass through his territory. Schaller (1967), working in India, found that does stayed with a territorial buck from February to November; during December and January, the breeding groups disbanded, and the blackbuck congregated in mixed groups. He noted, though, that the 2 breeding groups in Kanha Park stayed intact during the entire year. He hypothesized that variations in the pattern of social behavior may occur with small populations; in the absence of contiguous territories and competition for does, breeding groups may remain intact for longer periods. Apparently, that is the case for Bardia blackbuck; low numbers of animals and restricted range of movement has resulted in a stable breeding group.

The dominant male marked his territory by sniffing, pawing, urinating, and defecating at established dung piles. He also marked bushes and tall forbs with scent from his pre-orbital glands, and thrashed small bushes with his horns. The territory covered 36-40 ha; about 10 ha were planted with rahar dal, the rest was mainly pasture with some fields planted with mas dal.

On 2 occasions, the dominant male was seen chasing other males from his territory. Once, the 2-year-old and the yearling of the bachelor group were feeding in the dominant male's territory; the dominant buck approached them through the cover of a rahar dal field and, after entering the open, immediately began chasing the yearling at full speed. The chase lasted approximately 5 minutes and covered about 1 km, ending in the bachelor males' area. The 2-year-old trotted back to the same area. The second time, the yearling was feeding with the females in the dominant male's territory; the dominant male again

approached through a dal field and gave chase in the manner described above.

No territorial challenges were observed. The dominant male was seen several times with the bachelor group during early mornings. Once, he sparred with the adult bachelor male for approximately 2 minutes; after sparring, the dominant male stotted a short distance and trotted back to his territory. The bachelor males continued to spar intermittently for about 15 minutes, a third male often attempting to mount one of the sparring males.

Banke: Since I did not see any males in Banke, little can be said of their social behavior. Probably, normal patterns of social behavior are severely disrupted because of low numbers of blackbuck and the high degree of disturbance there.

Food Habits

Blackbuck in both areas depended heavily on agricultural crops for food. Villagers reported that blackbuck ate rice, mas dal, wheat, and mustard. Table 1 shows the main crops found in the blackbuck areas and their seasonal availability as food items.

Schaller (1967) reported that short grasses, such as *Chrysopogon*, *Paspalum*, and *Sporobolus*, composed the bulk of the diet, in Kanha Park. Young shoots of tall grasses, *Themeda* and *Vetiveria*, were eaten after burning. He noted that blackbuck were frequently associated with agricultural areas. Habitat displacement was a major reason for this behavior; nevertheless, blackbuck probably favored those areas because of the short graminoids associated with early successional stages resulting from heavy livestock grazing and agriculture.

Preference for early successional stages is an important consideration for blackbuck

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TABLE 1

MAIN CROPS OF THE BLACKBUCK AREAS AND THEIR SEASONAL AVAILABILITY AS FOOD ITEMS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice						×	×	×	×	×	×	
Corn					×	×	×					
Wheat	×	×	×									
Mas dal	×	×	×								×	×
Rahar dal	×	×	×				×	×	×	×	×	×
Musoori dal	×	×	×									×
Mustard	×										×	×
Peanuts									×	×	×	

habitat management. According to Puri (1960), in northern India short-grass types are maintained by heavy grazing and periodic fires. In the absence of grazing, large unbroken stands of *Imperata cylindrica*, a relatively unpalatable 0.5-1 m high grass, develop and are maintained by periodic fires. Where edaphic conditions are not limiting, eliminating fire leads to grasslands dominated by tall grasses (2-3 m), such as *Phragmites* and *Saccharum*. Succession can be reversed to favor short grasses by burning and mechanically breaking *Imperata* stands, making the area more suitable for grazing animals such as blackbuck.

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